

ABSTRACT OF THE DISCLOSURE

An ultrasonic transducer includes a first outer-electrode group and includes a first outer-electrode group and a second outer-electrode group, in which the piezoelectric elements and the internal electrodes is alternately layered respectively, and that are connected to the corresponding internal electrodes. Upon alternating voltage being applied to the first outer-electrode group and/or the second outer-electrode group, a primary resonant mode and a secondary resonant mode are simultaneously excited to generate ultrasonic elliptical vibration. The ultrasonic transducer further includes conducting films for connecting outer electrodes, formed closely contacting with the surface of the ultrasonic transducer, so as to electrically connecting predetermined outer electrodes in the first outer-electrode group to predetermined outer electrodes in the second outer-electrode group.